Sprint 2- Accuracy Design Document

April 6, 2020

# Executive Summary

### 1.1 Project Overview

The Accuracy sprint is intended for use in CS 104-01. The project calls for a program written in block code in the Sphero Edu app. The intended function of the program is to guide a robot to complete a figure-8 circuit 5 times. **Specific requirements from Prof. Eckert:**

Your robot must successfully run the figure eight course 5 times. A path will be laid

out on the floor. Your robot must stay within the path provided. Your robot will start and finish in the square provided. Upon finishing, robot will speak ‘I am the winner’ and flash multicolored lights for 5 seconds. Points will be deducted if your robot strays from the path, if it does not go around 5 times, or if it does not finish in the same place it started.

1.2 Purpose and Scope of this Specification

**In scope**

This module includes the following:

* A program for the SPRK robot provided for classroom use
* Block code compatible with the Sphero Edu app
* Completion of the Accuracy sprint from the overarching Robotics Project

**Out of Scope**

This module excludes the following:

* Code compatible with non-Sphero robots
* Specifications listed outside of the Accuracy sprint

# Product/Service Description

### 2.1 Product Context

The project relates to other products because a SPRK robot is required to run the program. A Bluetooth connection is also necessary for the robot to communicate with the device running the program.

### 2.2 User Characteristics

* CS 104-01 students or Prof. Eckert
* Basic understanding of the Sphero Edu app and block code
* No technical expertise required

### 2.3 Assumptions

The equipment necessary to run the program is available, including: Sphero Edu app, SPRK robot, HH208. The user has a general understanding of how to use the Sphero Edu app and the SPRK robot.

### 2.4 Constraints

* Block code is only compatible with the Sphero products
* The program cannot be used for robots not affiliated with the Sphero brand

### 2.5 Dependencies

The functionality of the program depends on access to the SPRK robot. Without the robot, the program cannot have the desired output. The program also depends on the Bluetooth connection between the computer and the robot so that the computer can communicate with the robot.

# Requirements

1. Priority 1
   1. Robot must perform a figure 8.
   2. Robot must not collide with anything during the circuit.
   3. Robot must complete the figure-8 5 times.
2. Priority 2
   1. Robot must return to its starting point after completing the circuit.
3. Priority 3
   1. Robot must speak at the end of the program.
   2. Robot must flash multicolored lights at the end of the program.

### 3.1 Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Requirement Number** | **Requirement** | **Comments** | **Priority** | **Date Reviewed** | **Reviewed/Approved** |
| 1a | Robot must perform a figure-8. | Only Neil has access to the robot, so he will need to ensure that the robot successfully passes each priority. | 1 | 4/5/2020 | AN, NS |
| 1b | Robot must not collide with anything during the circuit. | Slower speeds ensure that the robot executes the program with more precision. | 1 | 4/5/2020 | AN, NS |
| 1c | Robot must complete the figure-8 5 times. | The code should loop the figure-8 portion 5 times. | 1 | 4/5/2020 | AN, NS |
| 2a | Robot must return to its starting point after completing the circuit. | Carpet may need to be used, which could make the program less accurate. | 2 | 4/5/2020 | AN, NS |
| 3a | Robot must speak at the end of the program. | Robot has no speakers, so the device running the program must have sound turned on to hear the robot speak. | 3 | 4/5/2020 | AN, NS |
| 3b | Robot must flash multicolored lights at the end of the program. | n/a | 3 | 4/5/2020 | AN, NS |

### 3.2 Security

#### 3.2.1 Protection

Protection is not a concern with this project because our program cannot be misused or cause harm to anything. Malicious access is highly unlikely and the program will be made private on the Sphero Edu app so that it is protected against plagiarism by other students.

#### 3.2.2 Authorization and Authentication

The program is only accessible through our GitHub repository and one of our accounts on Sphero Edu. There is no authorization or authentication required to access our repository, but there is authentication required to access the program on Sphero Edu because only the owner can access it.

### 3.3 Portability

The program is only portable across Sphero’s line of robots as it is written in block code only compatible with Sphero robots. Any operating system can be used to access the Sphero website. The robot can execute this program anywhere, so long as all of the equipment is available and there is ample space for the robot to move in.

# Requirements Confirmation/Stakeholder sign-off

|  |  |  |
| --- | --- | --- |
| Meeting Date | Attendees | Comments |
| 4/5/2020 | Anna Nardelli  Neil Swagger  Connor Vidnansky  Andrew Welde | Approved all requirements |

1. System Design

### 5.1 Algorithm

1. The robot circles in one direction.
2. The robot circles in the other direction.
3. Repeat steps 3 through 5, five times
4. The robot says “I am the winner.”
5. Robot flashes multicolor lights.

### 5.2 System Flow

Uploaded to GitHub

### 5.3 Software

The software used to develop the program was the Sphero Edu app and Mac OS.

### 5.4 Hardware

The hardware used to develop the program was a personal computer and a SPRK robot.

### 5.5 Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Going the right direction | 4/4/20 | Go in a circle | Started going the right direction without making a huge circle | Neil | pass |
| Going the opposite direction | 4/4/20 | Going in the opposite direction in a circle making it look like a figure 8 | Went the right way and didn't hit anything | Neil | pass |

### 5.6 Task List/Gantt Chart

[Gantt Chart](https://drive.google.com/file/d/1_ujdgTyrMWYNqVLDwcH-S0eOTD8eKKzp/view?usp=sharing) (also uploaded to GitHub)

### 5.7 Staffing Plan

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Role** | **Responsibility** | **Reports To** |
| Anna Nardelli | Leader | Sections 1-4 of Design Document, Gantt Chart, making sure everyone else contributes | Everyone |
| Neil Swagger | Owner of robot | Type the program for the robot | Everybody |
| Connor Vidnansky | Design Document | Create the flowchart, approve of changes to code/Design Document | Everyone |
| Andrew Welde | Design Document | Write algorithm | Everyone |